Siderophile elements in dynamically segregated metallic liquids

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Introduction

The physical segregation of Fe-rich metallic liquids from silicate during the partial melting of chondrites imparts a geochemical signature on the composition of the resulting metallic liquids, as evidenced by the diverse compositions of iron meteorites. These chemical signatures vary according to parent body composition, segregation mechanisms and the degree to which early core-forming liquids (S-rich, and possibly O-rich) were extracted. We present new results on siderophile concentrations in metal dynamically segregated during partial melting and deformation of an ordinary chondrite.

Results

Metal quench in KM-17 (run conditions: P= 1.2 GPa, T= 940°C, strain rate=10^{-6}/s) and Kernouve H6 starting material were microanalyzed by LA-ICP-MS using the methods of [1]. Figure 1 shows selected siderophile element abundances in KM-17 metal on a Fe, H-chondrite normalized plot. Bulk H4-6 metal abundances [2] are plotted as the solid gray line. Kernouve (H6) kamacites determined by LA-ICP-MS are shown as dashed gray lines. Two main metal types were recognized in KM-17 run products. The solid black line resembles kamacite compositions and represents residual solid. The thin black lines represent liquid compositions, which are depleted in compatible siderophiles (Re, Os, Ir, W, Co, Ru), and enriched in Ni and Pd, with weak Ga, Ge fractionation.

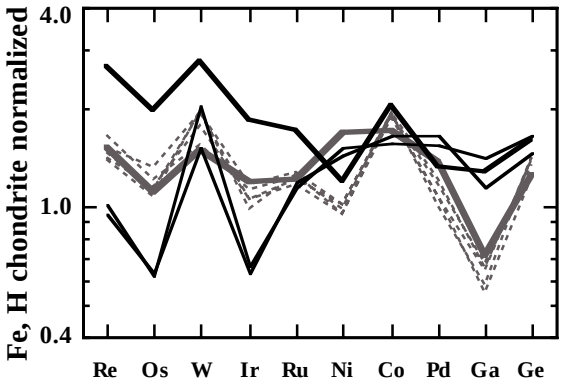

Figure 1: Siderophile concentrations of quench and residual metal in deformation experiment KM-17.

References

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Biomarkers and Climate Proxies, Lake Baikal, Siberia

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Compared with the evidence from the deep cores of the oceans most Quaternary continental palaeoclimate records are very fragmented (in space and time), primarily because of the effects of the advance and retreat of the great Northern Hemisphere ice sheets. Of the available continental archives lake sediments have the potential to provide long records of palaeoclimate change which might be comparable to the marine record. Lake Baikal in Siberia, the deepest continental depression on earth, is essentially unique as a natural laboratory for the study of continental palaeoenvironments. With over 7500m of accumulated sediments it contains a potentially uninterrupted record of past environmental conditions which would be comparable to that of the marine record.

Biomarkers have a proven record as proxies for palaeoclimate/palaeoenvironment studies in marine sediments, e.g. long chain alkenones and the calculation of sea surface temperatures (*e.g.* see review by Sachs *et al*., 2000), therefore their application to continental sedimentation is considered to be a realistic approach to determining past environmental and climatic states. We are studying the record of palaeoclimate changes in Lake Baikal by characterising and quantifying biomarker lipids in sediment trap material, water particulates and sediments at several sites in the lake. The lipids of the water filters (at 5, 10 & 30m depth) show compositional differences between the north and south basins of the lake and also a decrease in abundance with depth, more marked in the central basin. The sediment lipids are significantly different to the water column lipids, containing ketones and hopanoids and with more abundant *n*-alkanes.

This study is in the early stages but it is expected that as well as providing biomarker proxies for climate change in Lake Baikal that an insight into the similarities/differences between continental and marine records of climate change will be gained. In addition, it is hoped that a calibration of the continental record with the marine record will be achieved.

Sachs J.P., Schneider R.R., Eglinton T.I., Freeman K.H., Ganssen G., McManus J.F. & Oppo D.W. (2000), Alkenones as paleoceanographic proxies. *Geochemistry, Geophysics, Geosystems*, **1**, Paper number 2000GC000059